October 6, 2010

Comments on the draft OHV BMPS

There are some inherent problems with the OHV BMPs that must be addressed.

OHV roads and trails should not be handled any differently than other types of roads and trails, or singled out as main contributors to sediment pollution. Equestrian and mountain bike trails, or poorly sited hiking trails, can also be considerable contributors to sedimentation, and this must be reflected in these BMPS.

Every BMP, whether we're referring to native surface roads and trails, or paved roads used by passenger cars, should be written with only one purpose in mind – the affect on water quality. All BMPs should be interchangeable regardless of who is using the road or trail, and how it is being used, since the ultimate goal of the BMPs remains a constant. Done correctly, this would remove all references to OHV in the document.

Please remove the introductory paragraph to these BMPs. There is no justification needed for the Forest Service to undertake the process of writing new BMPs, and the language in this paragraph is unproven by science. It is hyperbole at best, taken directly from the suppositions used as an excuse for the Travel Management rule, and it casts a negative connotation on a legal, ongoing recreational activity enjoyed by millions of Californians in our national forests.

Thank you for your attention to these matters

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All About Access

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Introduction

Over the past few decades, the availability and capability of Off-Highway Vehicles (OHV's) has increased tremendously, as has the intensity of OHV use on National Forest System (NFS) lands.

This increase in OHV use can affect water resources. OHV use near water bodies, particularly at stream crossings, has the potential to cause the following impacts:

- Delivery of sediment and turbid water to streams and water bodies, particularly during storm events
- Vertical and lateral erosion of stream channels at stream crossings
- Destruction or weakening of riparian vegetation, which can compromise stream-bank stability and increase water temperature
- Water pollution by petroleum and chemical products and other organic and inorganic waste, including human pathogens

The purpose of this set of Best Management Practices (BMP's) is to control nonpoint source pollution that may occur because of OHV recreation activities on NFS lands. Activities that indirectly or directly affect OHV and could potentially impact water quality include travel route planning, trail location and design, construction, operations, maintenance, reconstruction, and restoration of OHV-damaged areas.

The term off-highway vehicle (OHV) means any vehicle used for access or recreation on roads, trails and areas other than those built and maintained for highway-licensed vehicles. It can include standard and high-clearance four-wheel drive (4WD) vehicles, off-road motorcycles (MCs), all-terrain vehicles (ATVs), dune buggies, Side-by Sides (Utility Terrain Vehicles - UTV's, Recreational Utility Vehicle - RTV's) and snowmobiles.

Sediment is by far the primary pollutant associated with OHV activity, although human waste and petroleum products can also be significant pollutants locally. Discharges of sediment into California's waters that are associated with OHV activity are caused by accelerated soil erosion. OHV traffic accelerates erosion by disturbing and exposing soils.

Trails are linear features that concentrate runoff. When runoff is concentrated on a trail and flows directly to a watercourse or water body, the trail becomes part of the drainage network, and creates hydrologic connectivity. Watercourse crossings, and OHV trails located near watercourses and water bodies, have a high potential for hydrologic connectivity. Consequently, watercourse crossings, and the OHV routes near them, have the greatest risk for sediment delivery from OHV activity.

OHV trails can also alter natural drainage patterns by intercepting, diverting, blocking, and concentrating surface and subsurface flows. Proper OHV management, trail location, design, construction, and maintenance can reduce the impact to natural hydrologic functions and water resources.

Road drainage treatments—for example, out-sloping, inside ditches, and crowned prisms—are not effective on OHV routes. OHV routes typically occur in native soil material that easily erodes. In contrast, to roads which are constructed from deeper sub-soil or regolith. Roads are also wider, have larger cuts and fill, are more compacted, and generally have gradients that are less steep than OHV trails.

Comment [Amy Grana1]: None of the other BMPs that have been presented to the Stakeholder group contain a paragraph of this type, It presumes a negative value judgment against a legal, ongoing activity in our national forests. Please see BMP 2-1 or 2-2 for example This sentence must be removed from these BMP's

Comment [Amy Grana2]: "Potential" is subjective, the issue is the development of BMP's to insure these potentials don't become reality. This is subjective in nature, and must be removed

Comment [Amy Grana3]: This is an incomplete definition of off-highway vehicle. OHV's may include street legal and non-street legal, and there are many examples of NFS roads and trails that are specifically maintained for use by street-legal vehicles.

This definition is also incomplete because it does not include the issues of access by OHV's for other forest uses, such as hunting, camping, equestrians activities, etc. It is only by understanding the myriad of uses that encompass the term OHV, that clear and concise BMP's may be written.

Comment [Amy Grana4]: Please note that not all OHV activity causes sedimentation, and when a trail is managed and maintained sedimentation is reduced and/or eliminated.

Comment [Amy Grana5]: Appears there is the assumption that the ohv trail has no constructed drainage features

Comment [Amy Grana6]: Assumes OHV trails are on steep grades and erosive soils, which is incorrect.

There are situations where implementation of these BMPs may need to be more rigorous and where additional practices may be needed. Such situations include a water body listed pursuant to Clean Water Act section 303(d) as being impaired by sediment, siltation, or turbidity; and key watersheds in the areas covered by the Northwest Forest Plan and the Sierra Nevada Framework.

Authorities

The Travel Management Rule (36 CFR, Parts 212, 251, and 261) adopted in 2005 provides the framework for managing OHV use on National Forest System lands. It mandates the USFS to designate routes for motor vehicle use by vehicle type, and if applicable by time of year, and to identify the route designations and seasonal restrictions on a motor vehicle use map (MVUM). With some exceptions, it prohibits motor vehicle use that is not in accordance with those designations.

Both the Northwest Forest Plan and the Sierra Nevada Framework incorporate Aquatic Conservation Strategies that encourage identification of key watersheds on national forest lands where protection of aquatic and riparian resources is a priority.

The Off-Highway Motor Vehicle Recreation (OHMVR) Division of the California State Parks has promulgated Soil Conservation Standards and Guidelines for all projects that it conducts and for which it provides funding. The Forest Service receives grant funding from the OHMVR Division for managing and developing OHV use on National Forest System lands. The Soil Conservation Standard specifically requires management of OHV activities to avoid impacts to both on-site and off-site resources, including water quality.

This Water Quality Management Plan (WQMP) provides specific practices to protect and restore water quality while providing opportunities for OHV recreation.

OHV-1 Planning

Reference: FSM 7710, FSH 7709.55 and FSH 7709.59 Chapter 10

Objective: To use the travel management planning processes, including travel analysis, to develop measures to avoid, minimize, and mitigate adverse impacts to water, aquatic, and riparian resources during OHV management activities, and to identify for restoration OHV-damaged areas and routes not designated for use.

Explanation: Determination of the amount, type and location of OHV trails made through various planning processes. OHV trail management planning includes travel analyses as well as trail management at the project level. Planning occurs at scales that can range from Forest-wide assessments and plans, to watershed scale analyses, to project-level trail activities. Effects on water, and on aquatic and riparian resources, are assessed during planning and are balanced with the need to provide OHV recreation opportunities. Protection and mitigation measures are considered when adverse impacts to water, aquatic, and riparian resources are anticipated.

Trail Management Objectives (TMOs) are developed to document the type of recreational experience each trail will provide, and to provide direction for management of the trail. In addition to considering trail management at the site scale, TMOs also document Forest-wide trail maintenance needs and consider the potential for environmental effects and conflicts with other resources.

The risk from OHV trail management activities can be managed by using the appropriate techniques from the following list, adapted as needed to local site conditions.

Implementation Techniques:

1. Conduct Travel Analysis to determine the appropriate trail system for the recreational objective.
2. Plan routes to:
   - Minimize ~~the number of stream crossings and the~~ hydrologic connectivity[1] of OHV trails and watercourses.
   - Avoid locations near wetlands (e.g., seeps, springs, marshes and wet meadows).
   - Use existing routes instead of new construction where less damage to water quality will result.
   - Designate existing routes that do not require reconstruction where slopes are between 50% and 65% and erosion hazard is moderate.
3. To the degree feasible, locate new routes on natural benches, flatter slopes, and on stable soils.
4. Avoid locating new routes on
   - Areas prone to landsliding;
   - ~~Slopes steeper than 65%;~~ ;
   - Slopes over 50%, which lead without flattening sufficiently to dissipate concentrated runoff and trap sediment before it discharges into a water body.
5. Identify trail segments causing adverse impacts to water resources and prioritize mitigation measures such as:
   - To the extent practicable, relocation of existing routes or segments that are in high-risk locations, including the SMZ, riparian areas, and meadows to restore surface and subsurface hydrologic properties.
   - Reconstruction to improve, modify, or restore effective drainage.
   - Upgrade of stream crossings.
6. Develop or update Trail Management Objectives (TMO) for each trail.

Comment [Amy Grana7]: Stream crossings are not necessarily always a problem. Properly hardened or managed crossings should not present sedimentation problems

Comment [Amy Grana8]: This is an unreasonable expectation. Because of changes in vehicle capabilities or intensity of use, trails may need reconstruction from time to time. It is impossible to consider that a trail will not need reconstruction, although proper maintenance will go a long way to insuring trail viability

Comment [Amy Grana9]: Add: while maintaining the recreational objective.

Comment [Amy Grana10]: Some slopes steeper than 65% are composed solely of rock. There is no need to prohibit access to these slopes.

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☐ When trails concentrate runoff that flows directly to a watercourse or water body, they become part of the drainage network and are said to be hydrologically connected. The amount of sediment or turbid water that can be transported to a water body from an OHV route depends on the hydraulic power and capacity of the flow leaving the route. The hydraulic power and capacity of the flow are influenced by the degree to which runoff has been concentrated in the trail.

- Define the recreation experience and level of difficulty the trail is designed to provide.
- Determine whether existing trail design standards are adequate to support the defined recreational experience, and whether impacts to water, aquatic, and riparian resources are likely to result from not following TMOs.
- Identify current and future needs and uses of each authorized route in the TMO.
- Identify trails that are being managed differently and/or are serving purposes other than those identified in TMOs.
- Operate the trail as intended by TMOs until the TMOs are revised and/or the trail is reconstructed to accommodate different uses.

OHV-2 Location and Design

Reference: FSM 7720 and FSH 7709.56

Objective: To prevent or minimize sediment or turbid water originating from designated OHV routes and OHV areas from entering watercourses and water bodies by locating OHV routes to minimize hydrologic connectivity, and by incorporating drainage structures into trail design to effectively disperse concentrated runoff.

Explanation:

Proper on-site location and design of OHV routes is essential, particularly at stream crossings (See OHV-3).

When trails concentrate runoff that flows directly to a watercourse or water body, they become part of the drainage network and are said to be hydrologically connected. The amount of sediment or turbid water that can be transported to a water body from an OHV route depends on the hydraulic power and capacity of the flow leaving the route. This is influenced by the degree to which runoff has been concentrated in the trail. Sheet and rill runoff typically cannot penetrate a buffer strip, but concentrated runoff often can.

Comment [Amy Grana11]: Please consider that constructed drainage structures will prevent this from occurring.

The potential to deliver sediment or turbid water originating from OHV routes and OHV areas to watercourses and water bodies following OHV use is a function of

- The number, location, and design of watercourse crossings
- The volume and energy of concentrated flow leaving the area or route
- The buffering capability (ability to absorb or disperse concentrated flow) of the intervening terrain, including slope gradient and surface cover
- The distance between the route and the receiving water body
- The inherent erodability of the disturbed and exposed soil

The first four of these factors determine the hydrologic connectivity between the route and the watercourse or water body. Watercourses are so important in managing the effects of OHV use on water quality that they have a BMP of their own. (OHV-3)

Comment [Amy Grana12]: There is no reference to mitigation by constructed drainage features to prevent water from reaching stream courses

The techniques included in this BMP are intended to improve drainage and reduce or eliminate the hydrologic connectivity of trails and watercourses. The risk from OHV use can be managed by using the appropriate techniques from the following list, adapted as needed to local site conditions.

Implementation Techniques:

Location

7. Locate OHV routes to avoid sensitive areas such as riparian areas, wetlands, meadows, bogs, fens, ~~inner gorges, overly steep slopes,~~ and unstable landforms to the extent practicable.
8. Limit hydrologically connected areas to necessary watercourse crossings.
9. Locate trails to minimize the capture, diversion, and/or concentration of runoff from adjacent slopes.
10. Limit the length of hydrologically connected trail segments as much as practicable.
11. Locate drainage structures near watercourses to maximize the filter distance between the drainage outlet and the water resource.
12. Locate steep routes only on well-armored locations than can sustain traffic without accelerated erosion.
13. Limit the length of steep stretches to less than 100 feet on highly erodible soils.

Design

14. Design and space rolling dips, critical dips, reverse grades, and over-side drains to remove storm runoff from the trail surface before it concentrates enough to initiate rilling or surface erosion.
15. Design trail surfaces to dissipate intercepted water by rolling the grade.
16. Where trails cannot be effectively drained by rolling the grade or using reverse grades, provide trail drainage using OHV rolling dips as specified in *Rolling Dips for Drainage of OHV Trails*, USDA-Forest Service, Pacific SW Region, January, 2006.
17. Wherever possible, incorporate sediment basins at the outlet for rolling dip outlets instead of lead off ditches.
18. Install energy dissipaters at rolling dip outlets if sediment basins will not work.
19. Extend drainage outlets beyond the toe of fill or side-cast.
20. Install aggregate, paver blocks, or other surfacing treatment on tread segments that are steep, erosive, or heavily traveled.
21. Design routes to be no wider than necessary to provide the recreation experience for which they designed as identified in the TMO.
22. Incorporate design elements that discourage off-route use (e.g., taking shortcuts, cutting new lines).

Comment [Amy Grana13]: OHV access to dry gorges and steep slopes should not create sedimentation problems. Many of these locations are composed solely of rock.

OHV-3 Watercourse Crossings

Reference: FSM 7722 and FSH 7709.56b

Objective: To prevent or minimize the discharge of sediment or turbid water into water bodies when locating, designing, constructing, reconstructing, and maintaining watercourse crossings.

Explanation: The importance of watercourse crossings in managing the effects of OHV use on water quality cannot be overemphasized. Of the pollutants generated by OHV use, sediment has by far the greatest volume and the greatest potential for sediment delivery at and near watercourse crossings where the potential for hydrologic connectivity is high. The approaches to watercourse crossings are typically constructed in native soils that can erode and deliver sediment to channels.

Typical OHV watercourse crossings include low water crossings, fords, bridges, arched pipes, culverts, and permeable fills. Crossing materials and construction vary based on the type of trail and kind of use. To minimize impacts to water quality, design crossings to provide for the unimpeded flow of water, bed-load and large woody debris, and aquatic organisms. Watercourse crossings must be constructed with minimal disturbance to the streambed and to surface and shallow groundwater resources.

Comment [Amy Grana14]: Implies crossings don't cant have constructed control features.

Fill-slopes and the approaches to watercourse crossings are especially important. All sediment resulting from erosion on these surfaces is delivered directly into the watercourse.

Construction, reconstruction, and maintenance of watercourse crossings often require equipment to be in and near streams, lakes and other aquatic habitats. Such disturbance can increase the potential for accelerated erosion and sedimentation by destabilizing stream-banks or shorelines, removing vegetation and ground cover, and exposing and compacting the soil. Permits may be required for in-stream work associated with stream crossing construction and maintenance projects.

The risk of sediment delivery at watercourse crossings can be managed by using the appropriate techniques from the following list, adapted as needed to local site conditions. Location, construction, and maintenance of watercourse crossings, and assessment of watercourse crossing condition, may require consultation with qualified personnel.

Implementation Techniques:

Crossing Location

23. ~~Locate OHV trails to limit the number of watercourse and surface-water crossings necessary to meet planned activity objectives. (See also OHV-1)~~

Comment [Amy Grana15]: As discussed earlier, water crossings are not necessarily bad and most can be performed without creating sedimentation problems.

24. Avoid long, steep trail segments on OHV routes that approach crossings.
25. Orient the stream crossing perpendicular to the channel in straight and resilient stream reaches.
26. Disturb as little area as possible when crossing a standing water body.

Trail Approaches to Watercourse Crossings[2]

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27. Install cross drainage (cut-off waterbreaks) at crossings to prevent water and sediment from being channeled directly into watercourses or surface waters.
28. Locate cut-off waterbreaks as close to the crossing as possible without being hydrologically connected.
29. To the extent possible, make crossing approaches short and level, or reverse the grade.
30. Armor steep crossing approaches with stable aggregate or trail hardening materials.
31. Where possible, such as at bridges or arch culverts, reverse the grade of the crossing approaches so runoff drains away from the watercourse.

Design of Watercourse Crossings

32. Design crossing approaches and nearby drainage structures to minimize hydrologic connectivity.
33. Instead of pipe culverts, use bridges, bottomless arches or buried pipe-arches for watercourses with identifiable floodplains and elevated trail prisms.
34. Design watercourse crossings to allow for unobstructed flow including bed-load and organic debris, and to provide for passage of desired aquatic and terrestrial organisms. [Add reference to manuals for sizing & AOP]
35. Place stable materials below the outlets of cut-off waterbreaks to dissipate energy.
36. Set crossing bottoms at natural levels of channel beds and wet meadow surfaces.
37. Construct watercourse crossings to sustain bankfull dimensions of width, depth and slope, and to maintain streambed and bank resiliency.
38. Harden fords with gravel or cobble of sufficient size and depth to prevent movement during wet weather traffic.
39. Stabilize crossing approaches as needed to minimize soil displacement by traffic during the rainy season.
40. Use USFS design specifications for bridges [Add reference].
41. Cross meadows or areas which have naturally high water tables with culvert arrays, perched culverts, and/or permeable fills to maintain meadow function.

Construction of Watercourse Crossings

42. Conduct construction operations during the least critical periods for water and aquatic resources (usually during low water conditions and non-spawning/breeding seasons).
43. Minimize excavation of stream banks and riparian areas during construction.

☐ The watercourse *crossing approach* is the segment of trail from the last point where all runoff is diverted from the trail to the edge of the stream channel. This last drainage structure is referred to as a "cut-off waterbreak."

44. Stabilize adjacent areas disturbed during construction.
45. Keep excavated materials out of channels, floodplains, wetlands, and lakes.

OHV-4 Construction, Reconstruction

Reference: FSH 7709.57

Objective: To prevent or minimize the discharge of sediment or turbid water into water bodies during construction and reconstruction of OHV routes and trails.

Explanation: Vegetation and ground cover is removed during trail construction and reconstruction, exposing the surface and subsurface soil to erosion. Temporary and long-term erosion control measures are necessary to minimize erosion and sediment delivery. The risk from trail construction and reconstruction activities can be managed by using the appropriate techniques from the following list, adapted as needed to local site conditions.

Implementation Techniques:

46. Windrow slash and surface duff and litter at the base of fill slopes to trap sediment.
47. When constructing trails near Streamside Management Zones (SMZ), do not permit side-casting of soil into the SMZ.
48. Do not operate equipment when ground conditions could result in excessive rutting, or runoff that could deliver sediments directly to watercourses or water bodies.
49. Construct OHV-rolling dips[3] when soil moisture is sufficient to allow adequate compaction of OHV rolling dip drainage structures.
50. Close newly constructed trails for one season to allow consolidation of soils in treads and drainage structures so treads and structures can better withstand OHV traffic.
51. Develop and implement an erosion and control sediment plan that describes:
    - Amount of vegetative clearing and amount of soil material to be moved
    - Proposed erosion control measures to retain sediment on the site
    - Proposed sediment control measures to capture mobilized sediment
    - Proposed sequence of implementation for erosion and sediment control treatments
52. Maintain erosion control measures to function effectively throughout the project area during trail construction and reconstruction.
53. Keep erosion control measures sufficiently effective during ground disturbance to allow rapid closure if weather conditions deteriorate.
54. Complete all necessary stabilization measures prior to predicted precipitation that could result in surface runoff.

Comment [Amy Grana16]: Overreaching, most trails have little to no cut and fills, soil types need to dictate closure needs.

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☐ *Rolling Dips for Drainage of OHV Trails*, USDA-Forest Service, Pacific SW Region, January 2006.

55. Complete erosion and sediment control treatments before leaving project areas for the winter or rainy season.

OHV-5 Monitoring

Reference:

Objective: To minimize sediment delivery to water, aquatic, and riparian resources by identifying OHV routes and trail segments in need of maintenance, by setting priorities for maintenance, and by identifying OHV areas and routes in need of restoration.

Explanation: The Forest Service monitors OHV activities and effects to detect existing and probable impacts to water quality, aquatic and riparian resources. The Forest Service regularly inspects OHV routes and areas. If adverse water quality effects are occurring or there is a potential to occur, the Forest Service will take ~~immediate~~ corrective action. Corrective actions may include, but are not limited to

- Permanent or temporary erosion and sediment control treatments
- Barriers and signing to redistribute use
- Reduction in the amount or type of OHV use
- ~~Partial or total closure of routes or areas~~

Implementation Techniques:

56. Conduct G-Y-R Trail Condition Monitoring as described in *Revised OHV Trail Monitoring Form (GYR Form) and Training Guide*, USDA-Forest Service, Pacific SW Region, July 30, 2004, to identify routes in need of maintenance and to prioritize maintenance activities.
57. Schedule GYR Trail Condition Monitoring so high-risk and high-maintenance routes are monitored annually; schedule the monitoring of stable routes less frequently, but not less than every three years.
58. Conduct periodic inspections of OHV routes use to identify and assess newly created unauthorized OHV use, and schedule restoration treatments.
59. Close routes that ~~pose~~ (create) immediate (and) significant ~~threats~~ (impacts) to water quality. As a minimum, install temporary erosion and sediment controls prior to the winter season.
60. ~~Close, and if possible,~~ Relocate routes that cannot sustain OHV use without causing adverse effects to the beneficial uses of water. Restore permanently closed routes or portions of routes.

OHV-6 Maintenance and Operations

Reference: FSM 7732, FSH 7709.58 and FSH 7709.59 Chapter 60

Objective: To prevent or minimize discharges of sediment or turbid water into watercourses and water bodies by maintaining OHV routes and associated drainage structures and by regulating OHV use.

Comment [Amy Grana17]: Please set up a system to measure the adverse conditions. For examples, adverse conditions may occur because of temporary conditions, or unusually heavy precipitation. The word 'potential' is problematic, and can lead to biased reporting of trail conditions.

Comment [Amy Grana18]: If these treatments are tried but unsuccessful, then partial or total closure of routes and areas

Explanation: OHV trails are linear features constructed in native soil that have a potential to concentrate runoff. Except for occasional hardened segments, trails are not typically surfaced with aggregate. In addition, normal OHV traffic tends to create an outside berm along the tread. Due to the presence of this berm, and gradients typically steeper than roads, runoff from trails cannot be readily drained by crowning or out-sloping as it can for roads. Drainage and erosion control facilities cease to function if they are worn down by continued traffic. These factors make periodic maintenance critically important in minimizing the impacts of OHV use on water quality.

Comment [Amy Grana19]: Not all types of OHV activities create berms along the tread – motorcycles are more typically the cause of this use, while ATV's, SXS and 4WD do not always create berms.

Trail drainage systems may further increase hydrologic connectivity if they deteriorate because of use, weather, or inadequate maintenance. Trail drainage facilities may become inadequate after wildfires or extreme precipitation events due to increased surface runoff, loss of vegetative cover, and stream bulking. New groundwater springs and seeps saturate trails occasionally after the occurrence of a wildfire or following unusually wet periods. Timely maintenance can correct these conditions.

Comment [Amy Grana20]: Please indicate what type of maintenance, and optimal frequency of needed maintenance as part of the BMP's. It is advantageous to the OHV community that the Forest Service recognizes and acknowledges the need for more attention and funding to maintenance of OHV roads and trails.

Trail maintenance with mechanized equipment such as SWECO-type trail tractors and mini-excavators can disturb soil, making it susceptible to erosion. Less aggressive maintenance is often necessary to minimize disturbance of stable sites.

Comment [Amy Grana21]: Drainage features constructed by mechanized equipment have a much longer life cycle and success rate than hand constructed features.

The construction of OHV rolling dips is from native soil material. For these structures to hold up under traffic they need to be well compacted. This requires moist soils and the scheduling of maintenance task to exploit the narrow window of time when soil moisture is optimal for compaction.

Comment [Amy Grana22]: Dips can be constructed with materials other than native soils, for example with rock, also water can be imported during construction

Obstructions to traffic such as fallen logs and potholes can lead to trail braiding, puddles and off-trail traffic. Prior to opening trails for use, or periodically for trails open year-round, clearing trails of obstructions can reduce the need for repair and restoration.

Comment [Amy Grana23]: Please recognize the extensive volunteer work force that engages in clean-up and repair of trails.

Trail management objectives (TMO) define the designed use, type of recreation experience, and the level of difficulty that a trail is designed to provide. It is important to maintain trails to the defined maintenance rotation, designed use and level of difficulty. The deterioration of trails to a more challenging difficulty level due to a lack of maintenance can affect water resources. More challenging trails often produce more sediment.

The effects of trail maintenance activities on water quality is managed by using the appropriate techniques from the following list, adapted as needed to local site conditions.

Implementation Techniques:

Maintenance Planning

61. Develop and implement annual maintenance plans that are based on the results of trail condition surveys (USFS - TRACS) and monitoring (G-Y-R) and periodic inspections. (See OHV-5)
62. Schedule maintenance to maximize the time-period when soils are at optimal moisture levels for soil compaction.

Inspection

63. Periodically inspect, monitor and assess trail condition to assist in setting maintenance priorities. (See OHV-5)

Comment [Amy Grana24]: Time frame of monitoring activities? Also, please make sure monitoring includes members of the broad OHV community.

64. Identify the need for additional drainage structures, spot rocking, or trail hardening to protect and maintain water, aquatic, and riparian resources.
65. After major storm events, inspect potential problem trails, drainage structures and runoff patterns and, as needed
    - Clean out, repair or reconstruct drainage structures that are not functioning
    - Clear the tread of obstructions to traffic that could lead to trail braiding or off-site impacts

Maintenance Activities

66. As per Regional Forester's direction dated 11-8-2002, follow the maintenance standards and guidelines in *A Field Evaluation of the Use of Small Trail Tractors to Maintain and Construct OHV Trails on National Forests in California*, USDA-Forest Service Pacific SW Region, August 22, 2001. These standards and guidelines include the following:
    - Lift the blade and walk equipment across sections of trail that do not need maintenance.
    - Recycle soil collected in rolling dip outlets into rolling dip structures or back into the trail tread.
    - Do not blade the outside berm off the trail as side-cast; work the berm back into the trail tread.
    - Blade soil sloughed from cut-banks, or from side-slopes above trails, only as needed to maintain a safe trail; do not undercut or blade into cut-banks.
    - Move the smallest amount of soil necessary to meet the maintenance objective.
    - Where soil is too dry or too wet for compaction, defer maintenance on drainage structures, or carry out maintenance by hand.
67. Maintain trail surfaces to dissipate intercepted water in a uniform manner along the trail by the use of OHV rolling dips. (See OHV-2 for design specifications)
68. Groom trails as needed with a rock rake to keep drainage outlets open.

Operations

69. Restrict OHV travel to designated routes or designated motor vehicle use areas rather than allowing cross-country travel.
70. Prior to opening routes for use, clear obstructions to traffic to avoid braiding.
71. Close routes or restrict OHV use when the potential for sediment delivery is high or during periods when such use would likely damage the tread or drainage features. (Also see OHV-7)

Comment [Amy Grana25]: Since these BMP's will go into effect after the Travel Management process, all forest s are already closed to cross-country travel. This was the discrete goal of the TMP

OHV-7 Wet Weather Management

<u>Reference:</u>

Objective: To prevent or minimize the discharge of sediment or turbid water into water bodies by closing OHV trails to traffic when soil strength is low and trail treads and drainage structures are susceptible to damage.

Explanation: Soil strength decreases as moisture increases. When soil strength is low, OHV traffic can lead to tread failure and damage to OHV rolling dips. Damage to trail drainage increases the risk of sediment delivery to watercourses and water bodies. Soil displaces and transports easily when soil strength is low and OHV traffic near watercourses and on crossing approaches can result in direct delivery of sediment or turbid water.

The susceptibility of OHV routes to damage when soil strength is low varies with soil type, amount of traffic, and type of vehicle. Each OHV area has a unique combination of soil types and precipitation patterns that determine the appropriate implementation techniques to minimize impacts to water resources during wet weather.

Comment [Amy Grana26]: The information in this paragraph is important, and should lead this 'Explanation' sub-catergory

Implementation Techniques: To manage sediment or turbidity discharges from OHV use when soils are wet, the Forest Service will use its authority under 36 CFR Section 261 to close designated OHV routes and areas to vehicular travel. This may be done seasonally by a given date, or be based on local conditions such as precipitation or measurements of soil trafficability. Use the following techniques, as appropriate, using local conditions for wet weather management of OHV trail systems:

72. Develop a wet-weather management plan.
73. Close routes seasonally for the months when soil moisture is typically high.

Comment [Amy Grana27]: Add: and sedimentation or turbidity discharges are likely to occur.

74. Close routes for a core period when soil moisture is expected to be high, and extend the closure period as needed, based precipitation or soil trafficability.
75. Determine the levels of soil strength and moisture at which OHV trail damage begins to occur for typical traffic, and close routes when measurements of soil strength indicate there is a high risk of damage to drainage structures and trail treads.
76. Identify benchmark locations where measurements of precipitation or soil trafficability will be taken to determine when trails will be closed.
77. Identify routes, or loops of routes, with similar conditions that can be selectively closed.
78. Identify and reroute or reconstruct trail segments which cause entire routes or trail systems to be closed because they retain moisture longer than is typical for the route.
79.

Comment [Amy Grana28]: Add: If adequate snow is on the ground such that tire contact with the soil is unlikely, OHV travel over-the snow can be allowed.

OHV-8 Restoration of OHV-Damaged Areas

Reference: FSM 7734

Objective: To prevent or minimize the discharge of sediment or turbid water into watercourses and water bodies by permanently restoring OHV-damaged areas, watercourse crossings, and OHV routes no longer designated for use.

Explanation: Loss of surface duff, litter, and vegetation leaves soils exposed and easily eroded. Ruts and tracks created by OHV traffic are unnatural channels that concentrate surface runoff and increase its erosive power. OHV traffic can also compact soils, causing increased surface runoff.

OHV traffic in wet meadows and marshes damages the root network that stabilizes sensitive soils. This can cause stream incision, which lowers the water table and results in a loss of meadow and riparian vegetation.

OHV-damaged areas, and OHV routes no longer available for use, are identified during the route designation process at the Forest and watershed level and during trail condition surveys and monitoring (see OHV-5). Identify additional trail segments for restoration when rerouting trails.

Restoration of OHV-damaged areas and closed trails includes activities that stabilize and restore the landscape to a more natural state. Treatments can range from simply scattering slash or raking in duff and litter, to watercourse or meadow restoration, to using heavy equipment to break up compaction, fill in incised trails, reshape the area to its natural contour, and install drainage structures. Planting native vegetation helps stabilize slopes, intercepts, and defuses rainfall. Effective closure from OHV traffic is essential to allow restored sites to recover.

Accomplish restoration of OHV-damaged landscapes by using the appropriate techniques from the following list, as applicable and adapt as needed to local site conditions.

<u>Implementation Techniques</u>:

Restoration of Routes and OHV-damaged Areas

When planning the restoration of OHV-damaged routes and areas consider the following steps taken from *Restoration of OHV-damaged Areas – A Ten-Step Checklist*, USDA-Forest Service, Pacific SW Region, May 31, 2006:

80. Identify the source of the problem
81. Effectively close the area to OHV traffic
82. Reshape the land surface to its original contour
83. Disperse concentrated runoff
84. Prepare the seedbed
85. Planting or seeding
86. Stabilize the surface
87. Signing
88. Enforcement and monitoring
89. Remove signs and barriers

More information on each step is included in the report. Additional information on restoring OHV-damaged areas can be found in *Restoration of Off-Highway Degraded Landscapes* (in press) USDA-Forest Service, San Dimas Technology and Development Center, 2010.

Restoration of Watercourse Crossings

With the possible exception of ephemeral watercourses (those that lack a well-defined, scoured channel), restoration of watercourse crossings should be done under the direction of—or after consulting—a qualified watershed specialist. A permit may be required if in-channel work is necessary.

When restoring OHV watercourse crossings, follow these guidelines as appropriate:

90. Remove any trail hardening materials and restore the channel bottom to its natural gradient and width.

91. If necessary, replace hardening material with cobble similar in size to the native bed-load.

92. Restore crossing approaches to insure that surface runoff does not reach the watercourse.

93. If necessary to divert runoff, install cutoff water-breaks as close to the crossing as feasible.

94. To the extent possible, reshape the stream-banks to their former natural contour.

95. Stabilize and re-vegetate the stream-banks.

OHV-9 Concentrated Use Area Management

Reference: FSM 2160 and FSH 7109.19 Chapter 40

Comment [Amy Grana29]: Information below this point is hard to connect to trail maintenance and construction, which is the goal of these BMP's.

Objective: To prevent or minimize the discharge into water bodies—or contamination of groundwater by infiltration through soils—of turbid water, sediment, petroleum and chemical products or human waste by planning, constructing, installing and maintaining drainage and runoff treatments at OHV staging areas, and by managing the risk of pollution at high-use and high-risk OHV areas.

Explanation: Petroleum products and chemicals from spills during refueling, leaking, damaged or overturned vehicles and from improper disposal, practices can be a source of water contamination. Small amounts can be absorbed by the soil and broken down, but the risk of water contamination is often high in concentrated use areas located near watercourses and water bodies.

Where sanitation facilities are not available or are inadequate, fecal matter and pathogens can enter water bodies. The risk of contamination from fecal matter and pathogens is highest in areas near water bodies with concentrated use. OHV staging areas sometimes constitute large areas with little or no infiltration capacity. Runoff from these areas is high and can transport sediment, nutrients and other pollutants to any nearby watercourses or surface waters.

OHV staging areas are sometimes used for winter recreation. Snow removal from these facilities may adversely affect water, aquatic, and riparian resources. Plowing can physically displace native or engineered surfaces, damage drainage structures, or alter drainage patterns. Snow plowing may also remove protective soil cover such as vegetation and mulch. These changes can result in concentrated flow, increased erosion, and a risk of sediment delivery.

The risk of delivering sediment, petroleum and chemical products, and human pathogens to water bodies at concentrated use areas can be reduced by using the appropriate techniques from the following list, adapted as needed to local site conditions.

Implementation Techniques:

Staging Areas

96. To the extent possible, locate staging areas away from water bodies and watercourses to reduce the potential for hydrologic connectivity.

97. Design OHV staging areas to accommodate the amount of use expected.

98. To determine necessary drainage, calculate the expected runoff using the appropriate design storm. Include run-on from adjacent areas.

99. Armor high-use areas with protective materials appropriate for the site.

100. Except where the risk of groundwater contamination is high, armor with permeable pavements and/or integrate vegetative islands to trap and filter runoff.

101. Infiltrate as much of the runoff as possible in areas where the risk of groundwater contamination is low.

102. Where staging areas are located near watercourses or water bodies, and the potential for hydrologic connectivity is high, install a contour berm and trenches around the perimeter to contain sediment and potential spills.

103. Provide permanent or temporary sanitation facilities as appropriate for the level of recreation use expected.

104. Adopt and implement a Spill Prevention, Containment, and Counter Measures plan.

105. Report hazardous spills and initiate appropriate clean-up action in accordance with applicable state and federal laws, rules and regulations.

High Risk Areas and Events

106. Develop and implement a fuel and chemical management plan (e.g. SPCC, spill response plan, emergency response plan) for special events and at locations where the risk of overturned vehicles is high. For example, extreme (highly technical) 4x4 trails and rock crawling areas.

107. Clean up and dispose of spilled materials according to specified requirements in the appropriate guiding document.

108. Report hazardous spills and initiate appropriate clean-up action in accordance with applicable state and federal laws, rules and regulations.

109. Provide temporary or permanent sanitation facilities as appropriate for the use level.

Camping Areas

110. Provide permanent or temporary sanitation facilities at high use areas, especially at campsites and day-use areas near water bodies, watercourses, and riparian areas and meadows.

111. As necessary and feasible, provide sanitation facilities at commonly used camping and resting sites and at other areas of concentrated use.

112. Provide education and training on the principles of backcountry sanitation, pack-it-in and pack-it-out.

Snow Removal

113. Develop a snow removal plan for OHV staging areas plowed for winter recreation.

114. Move snow in a manner that will prevent disturbance of road surfaces and drainage structures while protecting adjacent water, aquatic, and riparian resources.

115. Store snow in pre-approved areas where snowmelt will not cause erosion or deposit snow, road de-icers, or traction-enhancing materials directly into surface waters.

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☐ These references include information on OHV management, including trail location, design, construction, and maintenance, all of which affect OHV trail drainage, and therefore ultimately sediment delivery and potential impacts on water quality.

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